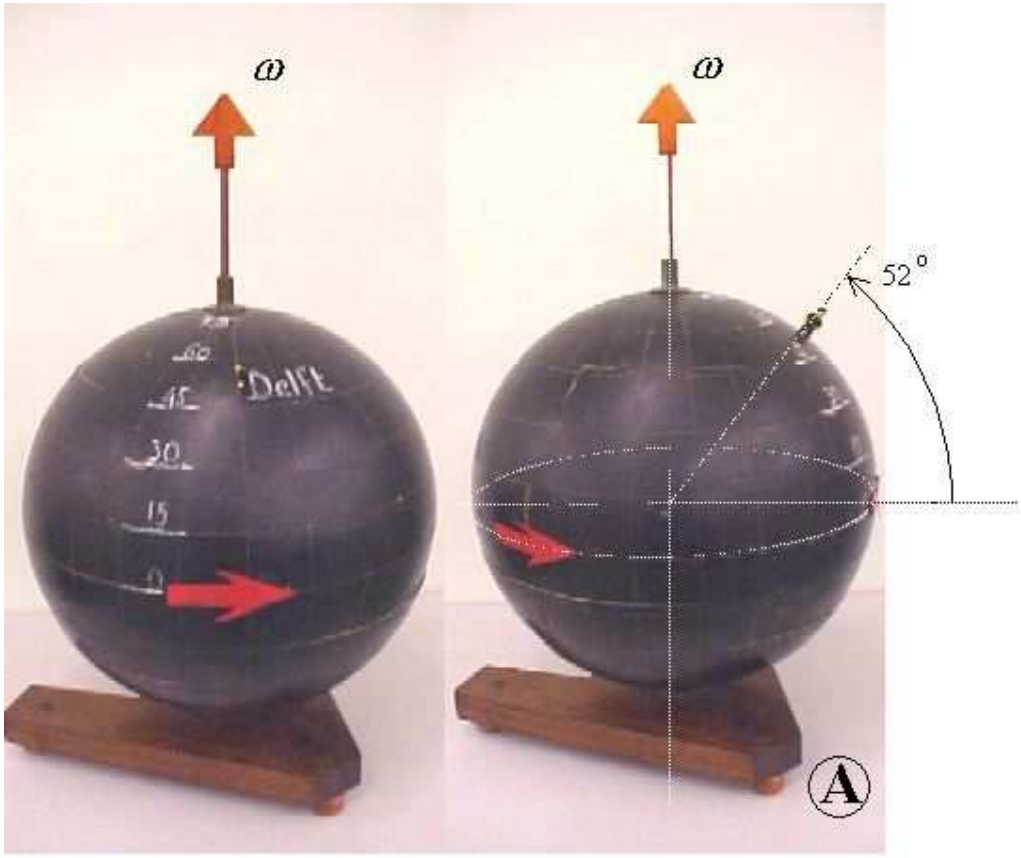
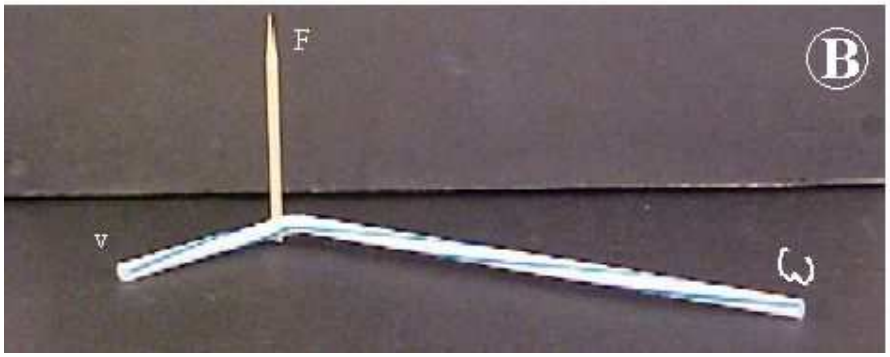
Coriolis (3)

Aim: To elucidate the direction of the coriolis force on our rotating earth.

Subjects: 1E20 (Rotating Reference Frames)
1E30 (Coriolis Effect)

Diagram:





Equipment:

- Globe.
- Flexible straw (v and ω in DiagramB).
- Toothpick (F in DiagramB).

Coriolis (3)

Presentation: On the globe our local position is indicated by sticking a small puppet at our coordinates (Delft, 52° Nothern latitude; see DiagramA). On the globe the sense of rotation is indicated by arrows stuck to the equator. This sense of rotation is also indicated by the ω_o-vector stuck into the Northpole.
The flexible straw is used as a resource to indicate simultaneously the direction of ω_o and the direction into which an object is moving (velocity *v*). The long arm of the straw is used to indicate the direction of ω_o and the short arm used to indicate the direction of *v*. Applying the corkscrew rule ($\vec{F}_{cor} = -2m\left(\vec{\omega}\times\vec{v}\right)$), the direction of F_{cor} is indicated by sticking the toothpick into the elbow of the flexible straw (see Diagram). The advantage of using the flexible straw is that easily the angle between ω_o and *v* can be changed; the toothpick can be easily shifted in and out the elbow when the corkscrew rule indicates that the direction of F_{cor} is different (see Figure1).

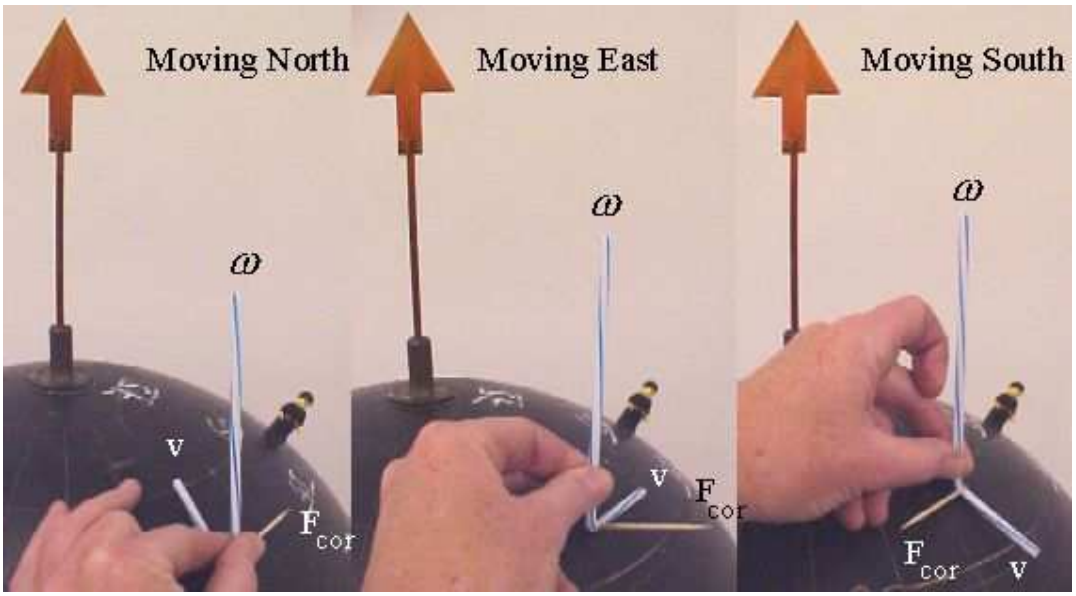


Figure 1

Remarks:

- On the Southern hemisphere this straw-toothpick vector model can be used when you keep ω_o pointing upwards, meaning that you have to keep the model a distance away from the globe.

Sources:

- Mansfield, M and O'Sullivan, C., Understanding physics, pag. 182
- McComb,W.D., Dynamics and Relativity, pag. 137-145
- Roest, R., Inleiding Mechanica, pag. 197-202; 205-210
- Giancoli, D.G., Physics for scientists and engineers with modern physics, pag. 291-292